ENGLISH

User manual

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Table of contents:

1. PRECAUTIONS AND SAFETY MEASURES 2
1.1. Preliminary instructions 2
1.2. During use 3
1.3. After use 3
1.4. Definition of measurement (overvoltage) category 3
2. GENERAL DESCRIPTION 4
3. PREPARATION FOR USE 4
3.1. Initial checks 4
3.2. Instrument power supply 4
3.3. Calibration 4
3.4. Storage 4
4. OPERATING INSTRUCTIONS 5
4.1. Instrument description 5
4.1.1. Description of the controls 5
4.1.2. Alignment marks and hand protection 5
4.2. Description of functions keys 6
4.2.1. /Data/Auto/Peak Hold key 6
4.2.2. Wide/50-60Hz/Compare key 7
4.2.3. Range key 7
4.2.4. Auto Backlight sensor 7
4.3. Operating instruction 8
4.3.1. AC Current measurement 8
4.3.2. Leakage current measurement 9
5. MAINTENANCE 10
5.1. General information 10
5.2. Battery replacement 10
5.3. Cleaning the instrument 10
5.4. End of life 10
6. TECHNICAL SPECIFICATIONS 11
6.1. Technical characteristics 11
6.1.1. Electrical specifications 12
6.1.2. Reference guideline 12
6.1.3. General characteristics 12
6.2. ENVIRONMENT 12
6.2.1. Environmental conditions for use 12
6.3. Accessories 12
6.3.1. Standard accessories 12
7. SERVICE 13
7.1. Warranty conditions 13
7.2. Service 13

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1. PRECAUTIONS AND SAFETY MEASURES

The instrument has been designed in compliance with directive IEC/EN61010-1 relevant to electronic measuring instruments. For your safety and in order to prevent damaging the instrument, please carefully follow the procedures described in this manual and read all notes preceded by the symbol ⚠ with the utmost attention.

CAUTION

Failure to comply with the caution notes and/or instructions may damage the instrument and/or its components and be a source of danger for the operator.

Before and after carrying out the measurements, carefully observe the following instructions:

- Do not carry out any current measurement in humid environments.
- Do not carry out any measurements in case gas, explosive materials or flammables are present, or in dusty environments.
- Avoid contact with the circuit being measured if no measurements are being carried out.
- Avoid contact with exposed metal parts, with unused measuring probes, circuits, etc.
- Do not carry out any measurement in case you find anomalies in the instrument such as deformation, breaks, substance leaks, absence of display on the screen, etc.

In this manual, and on the instrument, the following symbols are used:

CAUTION: observe the instructions given in this manual; an improper use could damage the instrument or its components.

Double-insulated meter.

AC current

DC voltage

Ground reference

This symbol indicates that the clamp can operate on live conductors.

1.1. PRELIMINARY INSTRUCTIONS

- This clamp has been designed for use in environments of pollution degree 2.
- It can be used for **CURRENT** measurements, on installations with overvoltage category III 300V. For a definition of the above-mentioned categories, see § 1.4
- This instrument is not suitable for direct current measurements
- Please take the standard safety precautions aimed at protect you against dangerous electric currents and protect the instrument against incorrect use
- Do not test circuits exceeding the specified current and voltage limits
- Check that the battery is correctly inserted

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1.2. DURING USE

Please carefully read the following recommendations and instructions:

CAUTION

Failure to comply with the Caution notes and/or Instructions may damage the instrument and/or its components or be a source of danger for the operator.

- Before switching on the clamp, remove the conductor from the clamp jaw.
- When the instrument is connected to the circuit under test, do not touch any unused terminal.
- During current measurement, any other current near the clamp may affect measurement precision.
- When measuring current, always put the conductor as near as possible to the middle of the clamp jaw, as described in § 0, to obtain the most accurate reading.
- While measuring, if the value or the sign of the quantity being measured remain unchanged, check if the HOLD or PEAK HOLD function is enabled.

1.3. AFTER USE

- When measurement is complete, switch off the clamp.
- If the instrument is not to be used for a long time, remove the battery.

1.4. DEFINITION OF MEASUREMENT (OVERVOLTAGE) CATEGORY

Standard IEC/EN61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements" defines what measurement category, commonly called overvoltage category, is. In § 6.7.4: Measured circuits, circuits are divided into the following measurement categories:

(OMISSIS)

- **Measurement category IV** is for measurements performed at the source of the low-voltage installation.
  Examples are electricity meters and measurements on primary overcurrent protection devices and ripple control units.
- **Measurement category III** is for measurements performed on installations inside buildings.
  Examples are measurements on distribution boards, circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to fixed installation.
- **Measurement category II** is for measurements performed on circuits directly connected to the low-voltage installation.
  Examples are measurements on household appliances, portable tools and similar equipment.
- **Measurement category I** is for measurements performed on circuits not directly connected to MAINS.
  Examples are measurements on circuits not derived from MAINS, and specially protected (internal) MAINS-derived circuits. In the latter case, transient stresses are variable; for that reason, the standard requires that the transient withstand capability of the equipment is made known to the user.

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2. GENERAL DESCRIPTION

Dear Customer, thank you for choosing one of the instruments in our range. If used according to the instructions given in this manual, the clamp you have just purchased will guarantee accurate and reliable measures. The clamp is designed to guarantee maximum safety, thanks to a newly conceived development, which ensures double insulation and enables the clamp to reach CAT III 300V in compliance with standard IEC/EN61010-1.

The instrument carries out the following measurements:

- AC TRMS current
- AC TRMS leakage current
- Peak value of AC current

3. PREPARATION FOR USE

3.1. INITIAL CHECKS

Before shipping, the instrument has been checked from an electric as well as mechanical point of view.
All possible precautions have been taken so that the instrument is delivered undamaged.

However, we recommend generally checking the instrument in order to detect possible damage suffered during transport. In case anomalies are found, immediately contact the forwarding agent.

We also recommend checking that the packaging contains all components indicated in § 6.3.1. In case of discrepancy, please contact the Dealer.

In case the instrument should be replaced, please carefully follow the instructions given in § 7.

3.2. INSTRUMENT POWER SUPPLY

The instrument is supplied with two 1.5V AAA LR03 batteries, included in the package.

In order to prevent compromising its charge, the battery is not inserted in the instrument. For battery installation, follow the instructions given in § 5.2.

The " " symbol appears when the battery is nearly discharged. Replace the battery, following the instructions given in § 5.2.

3.3. CALIBRATION

The instrument has the technical specifications described in this manual. The instrument's performance is guaranteed for 12 months.

3.4. STORAGE

In order to guarantee precise measurement, after a long storage time under extreme environmental conditions, wait for the instrument to come back to normal condition (see § 6.2.1).

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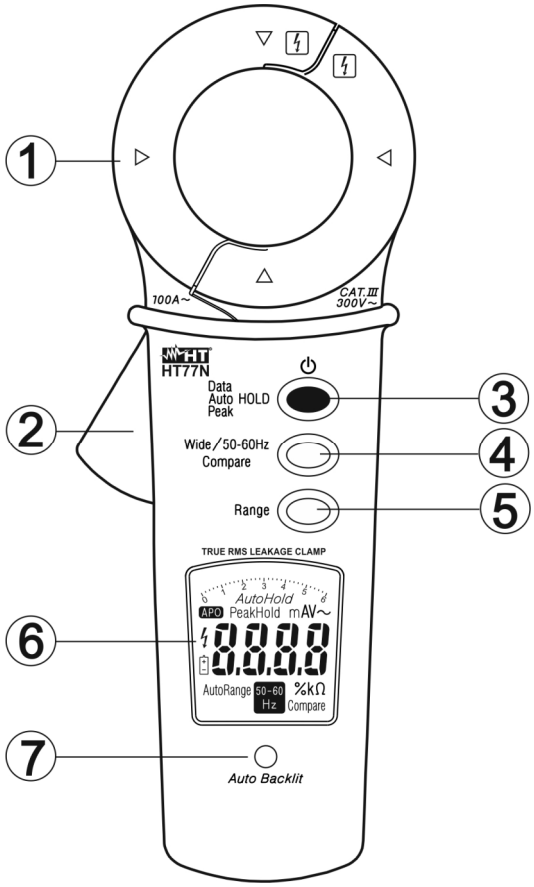
4. OPERATING INSTRUCTIONS

4.1. INSTRUMENT DESCRIPTION

4.1.1. Description of the controls

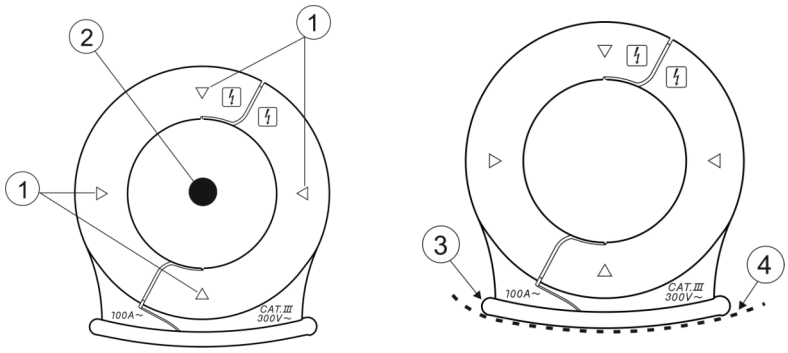


CAPTION:
1. Inductive clamp jaw
2. Opening lever
3. ⏻/**Data/Auto/Peak Hold** key
4. **Wide/50-60Hz/Compare** key
5. **Range** key
6. LCD display
7. Display backlight sensor

Fig. 1: Instrument description

4.1.2. Alignment marks and hand protection

Put the conductor as close as possible to the middle of the jaws on the intersection of the indicated marks (see Fig. 2) in order to meet the meter accuracy specifications.



CAPTION:
1. Alignment marks
2. Cable
3. Hand protection
4. Safe area

Fig. 2: Alignment marks and hand protection

Always keep your hands under the hand protection. This protection is always located in a suitable position to guarantee a correct safety distance from possible exposed or live parts (see Fig. 2)

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4.2. DESCRIPTION OF FUNCTIONS KEYS

4.2.1. ⏻/Data/Auto/Peak Hold key

Switching on/off

Shortly pressing the "⏻" key allows switching on the clamp. While switching on, the display shows the charge percentage of the power supply battery. Replace the battery the 0% appears (see § 5.2). To switch off the clamp, press and hold the "⏻" key for about 3 seconds.

Enabling/disabling the auto power off function

Long pressing the "⏻" key (> 3 seconds) allows switching on the clamp without enabling the "**APO**" (Auto Power Off) function. With enabled auto power off, the clamp switches off after approx. 20 minutes of idleness.

Enabling/disabling the AutoHold function

Long pressing the "⏻" key (> 5 seconds) allows switching on the clamp enabling the AutoHold function. With enabled function, the clamp automatically freezes the measured data when the measured current value goes from 0A to a higher value with at least 10 digits. The display shows "*AutoHold*" and the buzzer beeps three times in a short time. The clamp automatically exits the AutoHold condition after 5 seconds when no current is measured.

Data Hold

Shortly pressing the "⏻" key while measuring current allows holding the current value shown on the display. The display shows "*Hold*". With active **Hold** function, if the measured current increases by 50 digits with respect to the value shown on the display, the internal buzzer sounds continuously and the current value shown on the display flashes. Shortly pressing the "⏻" key again allows exiting the **Hold** mode.

Peak Hold

Long pressing the "⏻" key (> 1 second) during current measurement allows enabling the Peak Hold function. When the function is enabled, the full scale is forced in manual mode and the display shows "*PeakHold*". Shortly pressing the "⏻" key allows exiting the **Peak Hold** mode.

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4.2.2. Wide/50-60Hz/Compare key

Wide/50-60Hz

Shortly pressing the **Wide/50-60Hz/Compare** key allows enabling the low-pass filter, which has a cutting frequency of approx. 100Hz. When the function is enabled, the full scale is forced in manual mode and the display shows "*50-60Hz*". Shortly pressing the **Wide/50-60Hz/Compare** key again, with enabled function, allows disabling the low-pass filter and going back to the normal measuring mode.

Compare

Long pressing the **Wide/50-60Hz/Compare** key (> 1 second) allows enabling the Compare function. The display shows "*Compare*" and the set current limit value flashes. By pressing the **Range** key it is possible to set the limit comparison current among the following values: 0.25mA, 0.50mA and 3.5mA. To confirm the set value, press the **Wide/50-60Hz/Compare** key again. With active Compare function, if the measured current exceeds the set limit value, the internal buzzer sounds continuously and the current value shown on the display flashes. Long pressing the **Wide/50-60Hz/Compare**" (> 1 second) key again, with enabled function, allows disabling the Compare function and going back to the normal measuring mode.

4.2.3. Range key

Shortly pressing the **Range** key allows setting the measuring full scale in manual mode. In this condition, the display does not show "*Autorange*". Pressing the **Range** key again allows setting the desired full scale. To restore the Autorange mode, press the **Range** key for a time > 2 seconds.

4.2.4. Auto Backlight sensor

The clamp is equipped with a brightness sensor which, in case of low light, automatically activates the display's backlight.

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4.3. OPERATING INSTRUCTION

4.3.1. AC Current measurement

CAUTION

Insert the cable in the middle of the clamp jaws, in order to obtain accurate measures. Use the marks as a reference (see 4.1.2)

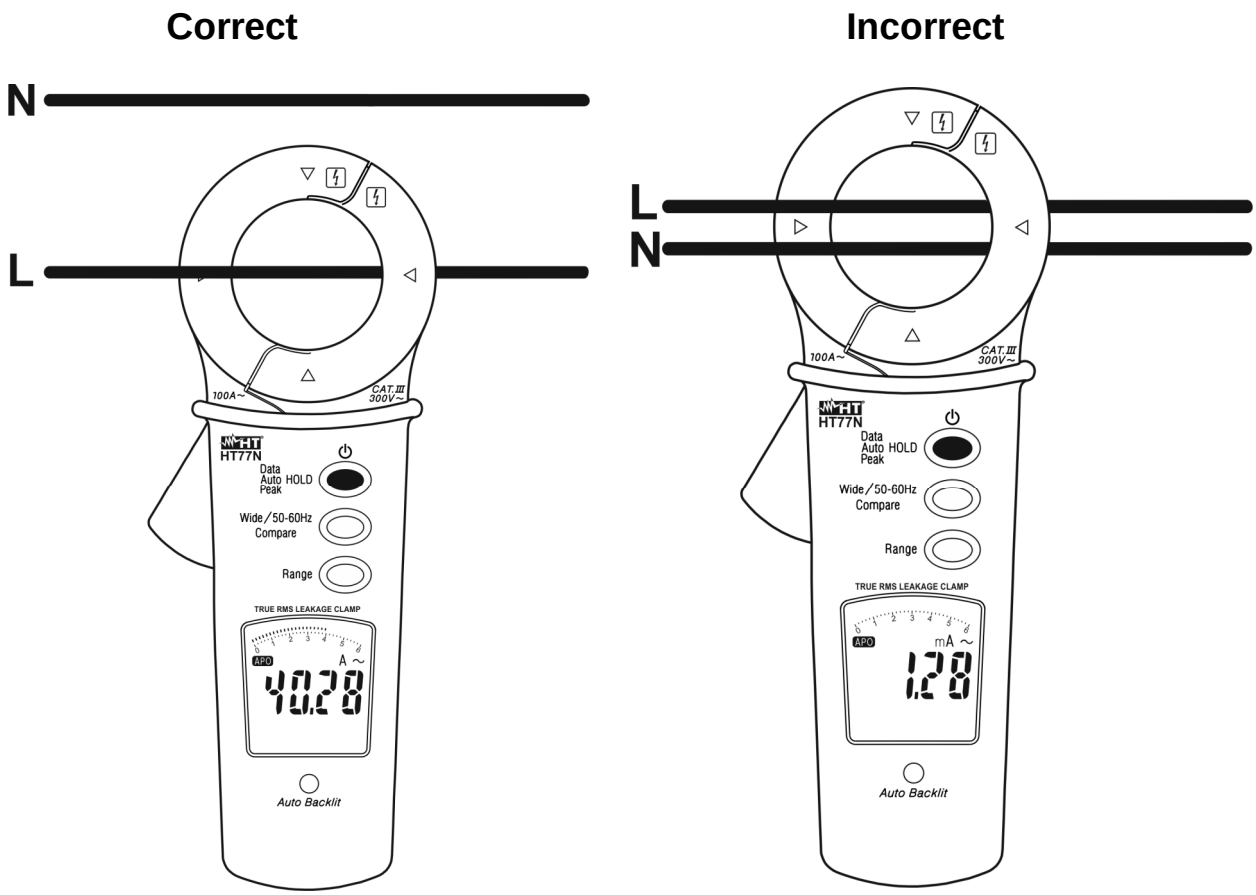

Fig. 3: Use of the clamp for AC current measurement

1. Switch on the clamp by pressing the ⏻ key
2. Select the desired capacity with the **Range** key or keep in the Autorange mode
3. Open the clamp jaw and insert the cable in the middle of it (see Fig. 3). The current value will be shown on the display
4. For Hold, Data Hold, Auto Hold and Peak Hold feature refer to § 4.2

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4.3.2. Leakage current measurement

CAUTION

Insert the cable(s) in the middle of the clamp jaws, in order to obtain accurate measures. Use the marks as a reference (see § 4.1.2)

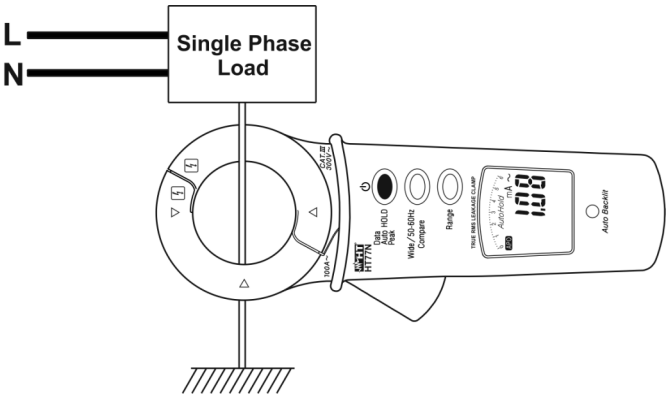

Fig. 4: Measuring leakage current with direct method in a single phase load

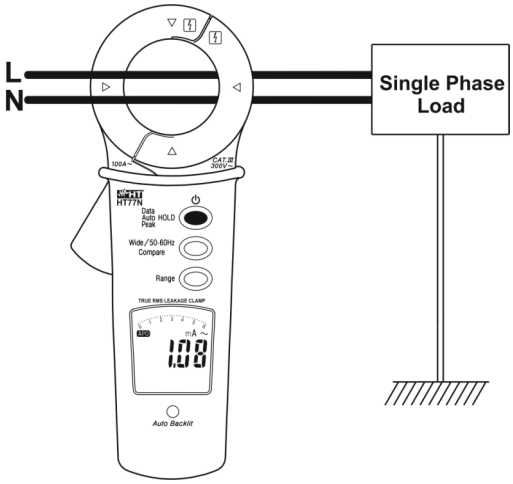

Fig. 5: Measuring leakage current with indirect method in a single phase load

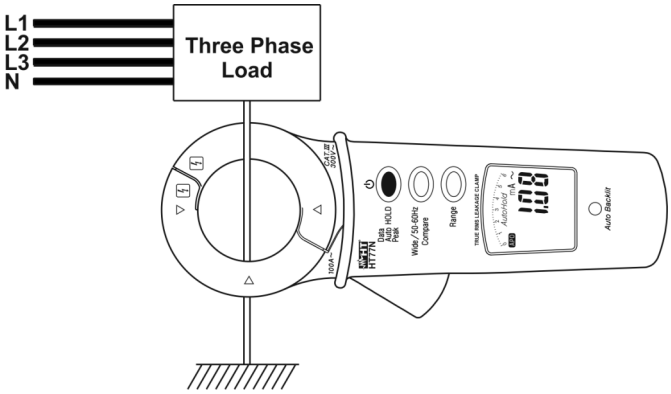

Fig. 6: Measuring leakage current with direct method in a three phase load

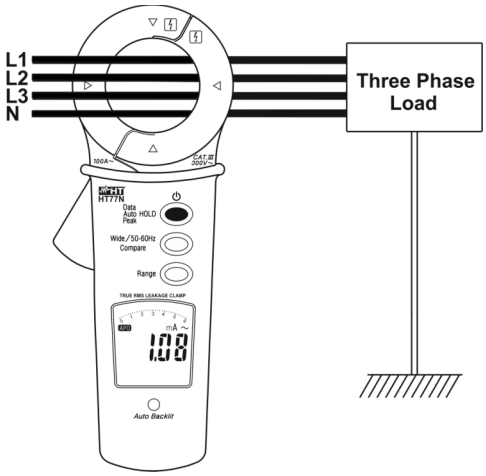

Fig. 7: Measuring leakage current with indirect method in a three phase load

<u>Leakage current measurement with Direct method on earth conductors</u>

1. Switch on the clamp by pressing the ⏻ key
2. Select the desired capacity with the **Range** key or keep in the Autorange mode
3. Open the clamp jaw and connect the clamp as shown in Fig. 4 or Fig. 6. The leakage current value will be shown on the display
4. For Hold, Data Hold, Auto Hold and Peak Hold feature refer to § 4.2

<u>Leakage current measurement with Indirect method</u>

1. Switch on the clamp by pressing the ⏻ key
2. Select the desired capacity with the **Range** key or keep in the Autorange mode
3. Open the clamp jaw and connect the clamp as shown in Fig. 5 or Fig. 7. The leakage current value will be shown on the display
4. For Hold, Data Hold, Auto Hold and Peak Hold feature refer to § 4.2

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5. MAINTENANCE

5.1. GENERAL INFORMATION

1. The instrument you purchased is a precision instrument. While using and storing the instrument, carefully observe the recommendations listed in this manual in order to prevent possible damage or danger during use.
2. Do not use the instrument in environments with high humidity levels or high temperatures. Do not expose to direct sunlight.
3. Always switch off the instrument after use. In case the instrument is not to be used for a long time, remove the battery to avoid liquid leaks that could damage the instrument's internal circuits.

5.2. BATTERY REPLACEMENT

When the LCD displays the "" symbol, replace the battery.

CAUTION

Only expert technicians should perform this operation.
Before carrying out this operation, make sure you have removed the cable being tested from inside the clamp jaw.

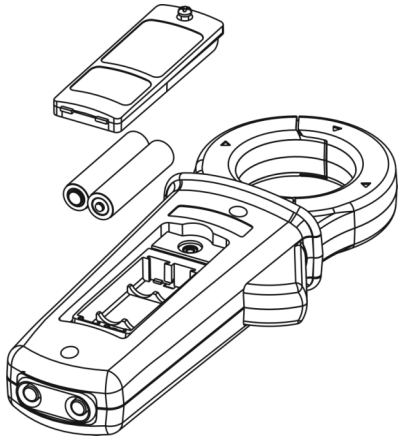

Fig. 8: Battery replacement

1. Switch off the clamp.
2. Remove the cable being tested from the clamp jaw.
3. Loosen the battery cover fastening screw and remove the cover.
4. Disconnect the battery from the connector.
5. Fit two new batteries (see § 6.1.3) and pay attention to correct polarity
6. Position the battery cover back over the compartment and fasten it with the relevant screw
7. Do not scatter old batteries into the environment. Use the relevant containers for disposal

5.3. CLEANING THE INSTRUMENT

Use a soft and dry cloth to clean the instrument. Never use wet cloths, solvents, water, etc.

5.4. END OF LIFE

CAUTION: the symbol on the instrument indicates that the appliance and its accessories must be collected separately and correctly disposed of.

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6. TECHNICAL SPECIFICATIONS

6.1. TECHNICAL CHARACTERISTICS

Accuracy indicated as [%reading + (digit number*resolution)] at 23°C±5°C, < 80%RH

AC TRMS current

Range	Resolution	Accuracy (50 ÷ 60Hz)	Accuracy (61 ÷ 400Hz)
6mA (*)	0.001mA	± (1% rdg+8dgt)	± (2% rdg+11dgt)
60mA	0.01mA		
600mA	0.1mA		
6A	0.001A		
60A	0.01A	0 ÷ 10A ± (1% rdg+8dgt) 10 ÷ 50A ± (2% rdg+10dgt) 50 ÷ 100A ± (10% rdg+10dgt)	0 ÷ 10A ± (2% rdg+11dgt) 10 ÷ 50A ± (10% rdg+11dgt) 50 ÷ 100A ± (35% rdg+11dgt)
100A	0.1A		

(*) With this capacity there may be an instability of 3 digits in readings
Frequency range: 50 ÷ 400Hz
Overload protection: 600V rms
Error due of position cable not in center of jaws: ±1%rdg
Error due to the influence of an external magnetic field of an adjacent conductor: 0.04% (typical value)
Response time PEAK HOLD feature: 50ms

Additional error due to the Crest Factor (CF) of non-sinusoidal signals:
C.F: 1.4 ÷ 2.0 → Add 1.0%rdg
C.F: 2.0 ÷ 2.5 → Add 2.5%rdg
C.F: 2.5 ÷ 3.0 → Add 4.0%rdg

Max. Crest Factor:
1.6 with 6000 ~ 5000 digits
2.0 with 5000 ~ 3000 digits
3.0 with 3000 ~ 0 digits

AC current with low-pass filter

Range	Resolution	Accuracy (50 ÷ 60Hz)	Accuracy (61 ÷ 400Hz)
6mA (*)	0.001mA	± (2% rdg+8dgt)	Not specified
60mA	0.01mA		
600mA	0.1mA		
6A	0.001A		
60A	0.01A	0 ÷ 10A ± (2% rdg+8dgt) 10 ÷ 50A ± (3% rdg+10dgt) 50 ÷ 100A ± (12% rdg+10dgt)	
100A	0.1A		

(*) With this capacity there may be an instability of 3 digits in readings
Characteristic attenuation: approx. -24dB/oct
Cutting frequency: approx. 100Hz
Overload protection: 600V rms

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6.1.1. Electrical specifications

Conversion type:	TRMS
Sample rate:	4 times / second
Temperature coefficient:	0.2x(accuracy) /°C, <18°C o >28°C

6.1.2. Reference guideline

Safety:	IEC/EN61010-1
Insulation:	double insulation
Pollution level:	2
Max height of use:	2000m (6562 ft)
Measurement category:	CAT III 300V

6.1.3. General characteristics

Mechanical characteristics

Size (L x W x H):	200 x 70 x 40mm (8 x 3 x 2in)
Weight (battery included):	265g (9 ounces)
Jaw opening:	40mm (2in)
Max. cable diameter:	40mm (2in)

Power supply

Battery type:	2x1.5V batteries type AAA LR03
Low battery indication:	symbol "+ −" at display
Battery duration:	approx. 60 hours
Auto Power OFF:	after 20 min of idleness

Display

Characteristics:	4 LCD, 6000 counts, decimal point, bargraph and backlight

6.2. ENVIRONMENT

6.2.1. Environmental conditions for use

Reference temperature:	23° ± 5°C (73° ± 41°F)
Operating temperature:	0°C ÷ 30°C (32°F ÷ 86°F) (RH ≤ 80%) 30°C ÷ 40°C (86°F ÷ 104°F) (RH ≤ 75%) 40°C ÷ 50°C (104°F ÷ 122°F) (RH ≤ 45%)
Allowable relative humidity:	<80%RH
Storage temperature:	-20 ÷ 60 °C (-4°F ÷ 140°F)
Storage humidity:	<80%RH

This instrument satisfies the requirements of Low Voltage Directive 2006/95/EEC (LVD) and of EMC Directive 2004/108/EEC

6.3. ACCESSORIES

6.3.1. Standard accessories

- User manual
- Carrying bag
- Batteries (not fitted)

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7. SERVICE

7.1. WARRANTY CONDITIONS

This instrument is warranted against any material or manufacturing defect, in compliance with the general sales conditions. During the warranty period, defective parts may be replaced. However, the manufacturer reserves the right to repair or replace the product.

The manufacturer declines any responsibility for injury to people or damage to property.

The warranty shall not apply in the following cases:

- Repair and/or replacement of accessories and battery (not covered by warranty).
- Repairs that may become necessary as a consequence of an incorrect use of the instrument or due to its use together with non-compatible appliances.
- Repairs that may become necessary as a consequence of improper packaging.
- Repairs which may become necessary as a consequence of interventions performed by unauthorized personnel.
- Modifications to the instrument performed without the manufacturer's explicit authorization.
- Use not provided for in the instrument's specifications or in the instruction manual.

The content of this manual cannot be reproduced in any form without the manufacturer's authorization.

Our products are patented and our trademarks are registered. The manufacturer reserves the right to make changes in the specifications and prices if this is due to improvements in technology

7.2. SERVICE

If the instrument does not operate properly, before contacting the After-sales Service, please check the conditions of batteries and replace them, if necessary.
Should the instrument still operate improperly, check that the product is operated according to the instructions given in this manual.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customer's charge. However, shipment will be agreed in advance.
A report will always be enclosed to a shipment, stating the reasons for the product's return.
Only use original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.

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